



Exploring Freshwater Ecosystems Fieldtrip Saginaw Bay Visitor Center Bay City State Recreation Area

Level: 4th, 5th or 6th Grade

FIELD TRIP PROGRAM DESCRIPTION:

Exploring Freshwater Ecosystems Fieldtrip (4-4.5 hours – including a 30 min lunch):

Students will participate in a ecosystem exploration experience which includes the collection of data in the field and interpreting the data by rating the environmental quality of the Tobico Lagoon. This program focuses on the importance water plays in every living creature's existence, the factors which indicate a healthy aquatic ecosystem and the role wetlands play in helping to store, clean, and buffer our ponds and lakes.

Arrival (15 minutes): Arrive at park and divide students into groups and go through station instructions.

Station 1 (15 minutes): The program opens with a National Wildlife Federation presentation on how important our water resources are, how wildlife and humans depend upon them for survival and how people are part of the problem and the solution.

Station 2 (30 minutes): This station includes a tour of the visitor center museum, which includes a point source – non-point source pollution display, a run-off game, a review of the Lesson Learned From the Bald Eagle and the opportunity to play a computer touch screen virtual fishing scenario where ultimately the student must catch, measure, and ID a fish then use the Michigan Fish Consumption Advisory to determine whether they will eat it or not.

Station 3 (45-60 minutes): Students participate in a Macro Invertebrate Survey by dipping for macro invertebrates in the bottom sediments of Tobico Lagoon, and indexing the quality of the habitat based on the intolerance of the organisms for pollutants.

Station 4 (45-60 minutes): Turbidity – Students investigate the bottom sediment of the Tobico Lagoon and the Saginaw Bay from the dock and/or canoes using a bottom dredger, and index the turbidity of each aquatic ecosystem using a secchi disk to determine the degree of suspended sediment and other solids that are in the water and reflect on the impact this has on the life forms which live there.

Station 5 (45-60 minutes): Shoreline Assessment – Students inventory types of land use adjacent to the aquatic ecosystem, wetland plant indicators, and other physical indicators to assess the health of the ecosystem and the potential for pollution.

Station 6 (45-60 minutes): Water Testing – Students perform freshwater limnological tests on a water sample to assess the quality of the ecosystem.

PROGRAM GOALS:

1. Each student will understand the connection between the environmental quality of the Bay and the health of the food web within its ecosystem, and have a better understanding how man is a part of the pollution problem and solution.

PROGRAM OBJECTIVES:

1. Each student will collect and through comparison and contrasting of physical traits will identify at least four macro invertebrates, which are found in the water.
2. Each student will be able to define the difference between tolerant and intolerant macro invertebrates.
3. Each student will be able to list at least three pollutants which affect the environmental quality of the freshwater ecosystem.
4. Each student will be able to explain how to use a secchi disk to measure turbidity.
5. Each student will be able to describe bottom sediment as a pollutant which decreases water quality.

6. Each student will be able to give an example of one way man's use of the land could affect water quality.
7. Students will be able to describe how wetlands help keep our water clean.
8. Students will be able to identify several components of an eagle's food web.
9. Students will use the MDCH Fish Consumption Advisory Guide to determine if their fish is safe to eat using a virtual fishing game.

PRE-VISIT SUGGESTIONS:

1. Call the visitor center to make you pre-visit classroom program scheduled for part one of you Lessons Learned from the Bald Eagle.
2. Be sure that every student is dressed for the weather conditions. Layers work best. Our weather can be 10 to 15 degrees cooler near the Bay than at your school site. Tell them to wear shoes which can get muddy and or wet.
3. Review Vocabulary: water, wetland, conservation, macro invertebrate, environment, temperature, sediment, turbidity, photosynthesis, oxygen, carbon dioxide, nutrients, pH, pollutant, abiotic, biotic, herbicide, pesticide, toxin, erosion, photosynthesis, run-off, evaporation, condensation, infiltration, precipitation, acid rain, predator, prey, adaptation, watershed, tolerant and intolerant.

POST-VISIT SUGESTIONS:

1. Make a chart or table depicting the data collected by each group. Graph the data collected.
2. Draw an aerial view of the Tobico Lagoon and label the locations of different types of habitats and land use found around the pond. Indicate inlet and out and direction of water flow.
3. Adopt a Stream! Select a site next to your school, draw up a conservation action plan, conduct a litter clean-up and conduct a school river monitoring day twice a year.
4. Keep a class scrapbook on newspaper articles regarding the Dioxin issue and other incidents which affect the water quality of the Saginaw Bay.
5. Follow up this program by participating in Fishing for Fun at Bay City State Recreation Area.
6. Teachers attend Project WET or Project WILD workshop and get two books bulging with fun interdisciplinary, cross-referenced, hands-on lesson plans for incorporating environmental messages into your current classroom curriculum.
7. Have the students design their own fish, name it and describe its food, water, shelter and space requirements.
8. Try out these activities with your students: Project Aquatic Wild: Fashion a Fish; What's in the Water?; Wetland Metaphors; Deadly Links, Project Wet: Water Address)
9. Visit a DNR Fish Hatchery.
10. Participate in the all new DNR classroom program "Salmon in the Classroom"
11. Participate as a class in the BAY SAIL program. Information on BAY SAIL is available from the Bay Area Visitors and Convention Bureau.
12. Obtain a list of land use precautions that the EPA has identified for people living or using land that has been contaminated by the dioxin.
13. Contact Saginaw or Bay County Health Department and ask for information on other environmental health programs which are available for your students.
14. Contact the Saginaw U.S. EPA office and see if a field agent is available to make a visit to your classroom or if they can make supplementary classroom materials available to your students. Mary Breeden, breeden.mary@epa.gov.

COORDINATING WITH MICHIGAN SCIENCE Grand Level Content Expectations:

Bold & Underlined=prominent program emphasis, Bold=reinforced through program, Italicized=program can be used to reinforce back in classroom

Science. Inquiry Process:

S.IP.04.11, S.IP.04.12, S.IP.04.13, S.IP.04.14, S.IP.04.15, S.IP.04.16,
S.IP.05.11, S.IP.05.12, S.IP.05.13, S.IP.05.14, S.IP.05.15, S.IP.05.16,

S.IP.06.11, S.IP.06.12, S.IP.06.13, S.IP.06.14, S.IP.06.15, S.IP.06.16,

Science. Inquiry Analysis & Communication:

**S.IA.04.11, S.IA.04.12, S.IA.04.13, S.IA.04.14, S.IA.04.15,
S.IA.05.11, S.IA.05.12, S.IA.05.13, S.IA.05.14, S.IA.05.15,
S.IA.06.11, S.IA.06.12, S.IA.06.13, S.IA.06.14, S.IA.06.15**

Science. Reflection & Social Implications:

**S.RS.04.11, S.RS.04.14, S.RS.04.15, S.RS.04.16, S.RS.04.17, S.RS.04.18, S.RS.04.19,
S.RS.05.11, S.RS.05.12, S.RS.05.13, S.RS.05.15, S.RS.05.16, S.RS.05.17, S.RS.05.19,
S.RS.06.11, S.RS.06.13, S.RS.06.14, S.RS.06.15, S.RS.06.16, S.RS.06.17, S.RS.06.18,
S.RS.06.19**

Physical Science. Properties of Matter: P.PM.04.23

Physical Science. Changes in Matter: P.CM04.11

Life Science. Organization of Living Things:

**L.OL.04.15, L.OL.04.16,
L.OL.05.41, L.OL.05.42,
L.OL.06.51, L.OL.06.52**

Life Science. Heredity: L.HE.05.11

Life Science. Evolution:

**L.EV.04.21, L.EV.04.22,
L.EV.05.11, L.EV.05.12, L.EV.05.14, L.EV.05.21**

Life Science. Ecosystems:

**L.EC.04.11, L.EC.04.21,
L.EC.06.11, L.EC.06.21, L.EC.06.22, L.EC.06.23, L.EC.06.31, L.EC.06.32, L.EC.06.41
L.EC.06.42**

Earth Science. Earth in Space & Time: E.ST.04.12, E.ST.05.25

Earth Science. Solid Earth: E.SE.06.11, E.SE.06.12, E.SE.06.13

COORDINATING WITH M.E.A.P. SOCIAL STUDIES CONTENT STANDARD BENCHMARKS:

Geographic Perspective

Civic Perspective

Public Discourse &

Decision Making

II.1—I.e.2
II.2—I.e.1, I.e.2, I.e.3, I.e.4
II.4—I.e.5 & II.5—I.e.1

III.3—I.e.2
II.4—I.e.2

VI.1—I.e.1, I.e.3

Correlating with the Common Core NGSS Standards

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on

defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* [Clarification Statement:

Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes. [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).]

MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the

natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*

[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human

populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]